HFT

Note:

I finally stapled in some
loose cards and materials, and
made trivial changes in arrangement,
13 Jan 67. Hence cards of this
number.

POT THIS AT BEGINNING 1892

HFT
OUTLINE.

Intro.   Novelty?

Penetration. Trivialization. Whimper, not bang.

FILE STRUX FACILITY.

IR, CAI, ~~CR~~.

Htxts

Hgrams

perception 🐷

Computer Publishing. OPTICS. Big machines.
Danger of loss.

Probs. for civil liberties. Captain and first mate.

HFT

"Hard and Fast Thoughts for a Softcopy World" (Formerly OWA)
"the other way around"

Lecture to be given at the Rand Corporation

22 September 1966

Beginning.

The line I'm going to take in some ways resembles that of Herman Kahn: that is, the possible worlds that lie before us are diverse and drastically different from this one, and decision and effort will be needed to obtain the better. Or I could compare my opinions to those of Timothy Leary: that is, I believe a blissfully better world is obtainable, that in this new world we will communicate better both with inanimate things and with each other, but that this world will result from turning on machines rather than people.
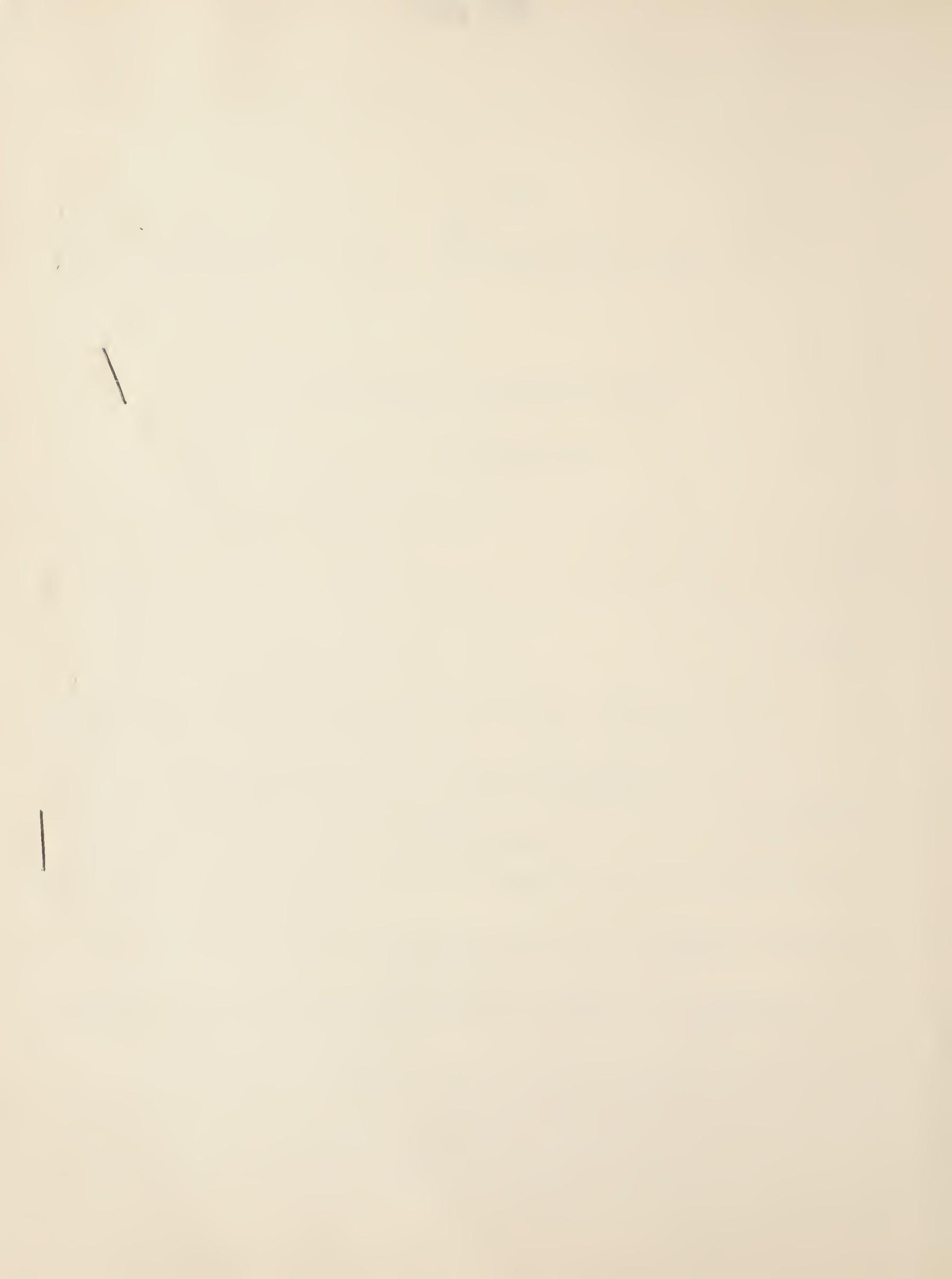
The computer is the most remarkable projective device [psychiatric] ~~ever discovered~~

ever discovered. (I get this point from R. F. Bales.) Everybody who sees a

computer will tend to see a beast capable of performing the jobs he wants done in

the way he would like them done. There is at once its grandeur and its sorrow.

CORPORATE PHILOSOPHY OF A MAJOR COMPUTER FIRM

In a way this turns the ~~IBM~~ corporate philosophy on its head: the ~~IBM~~ philosophy

is to shape an existing system to fit a new problem. What we need are new systems

made to fit the range of humanistic purposes now becoming evident.

Sometimes, I think that when Americans see a beautiful

stretch of road they just naturally want to fill it up with Tastee-Freez

stands. And I think this is what has happening to the field of computer display.

A great many corny things are being done with computer displays, and its extra-

ordinary potentialities are virtually untapped.

The
~~A~~ number of alternatives-- of technological alternatives-- that are ever tried is

perhaps

~~extremely~~ narrow. I can't help thinking that a lot of things are uninvented that

hovercraft

might have changed the world 200 years ago. For example, could not the ~~Hover~~

~~Craft~~ have ~~not~~ been discovered before the development of the automobile?

The on-line computer has been until now used as a glorified desk

'I'M TARZAN, YOU COMPUTER' level

calculator or *now* maybe an instantaneous librarian.

Possible uses of DISPLAYS (explain) virtually UNTAPPED

Somethings, when approached mundanely, can produce results which are

pedestrian,

esthetically grim.

HFT ↘

(Keep repeating),

but ~~and~~ of course, these

things are only

novelties.

We can have animated

line drawings of

machinery. (")

Line drawings of architectural

structures through which

the → user many move (")

Instantaneous transmission to your

screen of any written

information stored in the

computer system. (")

Essentially, there are two possible views to take with regard to/computer display. The first

is that the CRT is a novelty-- as soon as the airline market is saturated it will

pass over; perhaps the banks will be automated, perhaps there will be some use of

computer-driven programmed learning, but life will be <u>90%</u> unaffected.

~~On the other hand, the people who pay lip service to what is called~~

On the otherhand, the people who are paying lip service to what is being

called "artificial intelligence" seem to believe that machines will become

smarter, communicate among themselves, and write our novels, plays and books.

Men will lie in hammocks and think beautiful thoughts. I have heard such people

attribute only one human activity to be worthy of man's mind after that time, and

that will be proving beautiful math theorems. Things will be 99% changed.

My view is somewhere between these: that is, I think things will be

90% changed. We will ~~travel~~ to a softcopy world, where it becomes largely

unnecessary and hampering to commit anything to paper, displays will be with us

every where we go, either mounted, fixed, in our rooms, or carried as part of our

equipment in briefcases, or even clothing. I say things will be 90% different

because America will still have an economy, business, marriage, professionalism,

slums and prejudice.

Many people expect a high computer penetration of our daily lives, but evidentally few anticipate great impact on arts and letters. But I believe that this, when it occurs, will be the computer's greatest effect. The grubby little business applications will seem as nought.

'These applications may just shut out
the computer people, too.'

Apparently there is some disgruntlement in the computer community at the

fact that computers are becoming more accessible to the uninitiated, and they can

now be used more easily for a variety of purposes. Indeed, DATAMATION reports a

complaint from the floor of a recent conference about the use of mighty-on line

systems for "pipsqueak data."

But the use of "pipsqueak data" for piddling purposes is in a way the measure

of the successful penetration of technology in our lives; this is my basic point.

Last night; 31,000

on the order of
~~Yesterday,~~ ~~35,000~~ feet in the air and at a speed ~~in excess of~~ 600 miles per hour,

various   were treated to
I and a ~~hundred~~ other people sat and ~~watched~~ a film entitled "The Ugly Dachsund."

The trivial uses of the telephone, the radio and TV are by now very well-known

to us. The trivialization of the computer display should be a similarly disappointing

triumph. The world will be revolutionized not with a bang, but a whimper.

PIPSQUEAK

'CREATIVE FILE STRUCTURE',
slides, ~~film~~

8

A great deal of money and

attention is now going into what I would call sow's ear systems. Let me discuss

two of these: "information retrieval" and programmed learning, or CAI-- Computer

Assisted Instruction, if that is not now a proprietary term.

IR Slides (Pt. I)

The deepest criticism is

1)

that all coding schemes are doomed to decay as our interests, our language and

our subjects change; and so every coding scheme used to organize a corpus of

information will fall apart just as surely as the decimal system has done. And

2) of   Why

more immediate criticism is that document retrieval. ~~As we that~~ we want to get

?   in

back documents, which is a most shaky assumption. Perhaps ~~the~~ dealing with short

wholly

scientific papers this may be helpful, but in any larger context it becomes ~~wholely~~

unworkable.

Not saying a word abt. it.

~~The counterpart of document retrieval is~~ content retrieval, or the question-

very good. BUT

answering system; ~~about this I will only say that~~ it assumes that the field of

possible answers with which it is supplied is all true and correct and consistent;

this assumption must be questioned for a long duration to come.

CAI slides

BORING

Now to speak of programmed learning. Programmed learning today is chiefly

in a restricted tutorial format, which interposes between the student and the

material a new obstruction, different from the old obstruction of the classroom

scene but in my mind not very much better. IBM's hottest, new offering, the 1500

instructional system, is built around just such a vision; and the sorts of approach

which I am proposing, making large amounts of insightful material directly accessible

to the student, can not conveniently be implemented on this system or any other

system so conceived.

resilience

It is an interesting comment on the perverse ~~use~~ of the American professional

system that despite this bad start, computer-assisted instruction is slowly rotating

in the direction I ~~am~~ propose.

"Scientific " CAI is about as scientific as objective tests are objective.

Grading in general is a nice example of how pseudo-exactness becomes a playing

field for the clashes and machinations of personality.

What do we really need in teaching? Real needs are the hardest thing to assay

in any area. They can always be swept under the carpet, and their manifestations

interpreted as calling for more of the same remedy or system which has been current.

For example, the increases in crime appear to most people simply to call for more

police. Another nice example is the problem of the number of doctors. I believe that

the number of doctors being turned out by American medical schools has not increased

substantially in the last fifty years, though the population of the country has

more than doubled. Neither has the building of hospitals at all kept pace with the

expansion of the population. Yet where is the "need" for more of these facilities

and people felt? Answer: it is not felt, it is not organized; people just die

needlessly and unsung, from worse~~s~~ and worse~~s~~ treatment ~~and to~~ *under* poorer~~s~~ and

poorer circumstances, but there is no documentation of this, there is little to

be heard or seen even if you are in the crowded ward where this is happening.

The "needs" of education are a matter of fad, taste and rearing, as

perversely amplified in the conservative men who reach school boards. The

"real needs" are unfelt; what might be possible and excellent is very hard to

find out;

certainly, "normal" education has no more justification than any other. And

the notion of the class of 20 pupils, confronting a teacher within a context of

lecture and "class discussion" is less ~~than~~ a justified system than an image

clamped on the American mind.

But in fairness it should be said that what's his name at the other end of the

log had surely no more justification.

HFT

6-year-olds in Japan are
expected to know 1300
ideograms

1738

→ That would be about
11th grade level here.

OWA

Sylvia Ashton-Warner machine!

Kid types word, it guesses word
and pronounces.
Gives list of words, pronounces each,
lets kid choose.

1679

HISXY Slides

IR Slides (Pt. II)

HGRAM slidos

Section on hypergrams.

I expect the conventional illustration, as we know it now, to be

supplanted in the softcopy world by the Hypergram. The Hypergram may be

described as a ~~entirely~~ multi-dimensional diagram, or a picture that responds

to the user, or a picture with many levels, compartments, variations and

hidden features to which the user may have access.

~~hidden potentialities.~~ But I would sum all this up by ~~saying~~ defining the

Hypergram negatively, as any picture which cannot be usefully put on paper.

The Hypergram requires representation in some assembly which ~~would~~ will permit

its viewing and ~~manipulation~~ manipulation on-line by the user. This means, of course, the

computer display, although it may appear in other varieties associated with
by and by

video, cinematic storage, ~~photo-digital flash~~ photodiode digital logic arrays, and

holographic display.

Hypergrams may be of all sorts. 1) they may be "real"-- that is,

representations of real objects that look more or less like ordinary pictures.

2) They may be schematic or explanatory, like "illustrations," containing pointers, departures from reality

indicators or markers of various kinds, explanatory labels, cursors or other

indication marks, outlines, skeletons, or other structural emphases. 3) They may

be fanciful, showing non existent objects within a context (or having a structure)

in which they may be useful or interesting. An example, say, would be a drawing

illustrating "The House of Intellect" (Jacques Barzun) , a drawing that would

allow the user actually to enter (or peep into) this house of intellect and

view various scenes or texts. Sizable examples could of course be far

more complex, multi-dimensional, etc.

3

4) Hypergrams may also be mnemonic and presentational, having a structure of use

to the human intellect rather than particularly related to reality.

5   Manipulable diagrams, such as the mechanical linkages of Sutherland's

Sketchpad, ~~are~~ *or* pictures of machinery that enable the user to practice their

manipulation without tying up or endangering the real machines themselves.

2

I believe the first thing that can be called a Hypergram was

Most of CS → Now 3D

Sutherland's Sketchpad system, well known to us all. But since that system

was concerned more with providing a facility for the creation of pictures,

rather than with supplying the pictures,

but that may be regarded as a facility for creating Hypergrams, rather than

the Hypergrams themselves.

Consider also simply what study is possible with a manipulable

diagram which can be indefinitely ~~accepted~~ dissected: consider, for example, the

cases of the automobile engine or the human body. Let us consider that one

especially.

One of the great privileges, and initiations of medical education

is the actual disassembly of a ~~huge~~ used human being. This procedure is obviously

of the greatest educational value, and for other obvious reasons, one which

7

cannot be extended to the public in general. But why not the equivalent?

What could be more interesting than to give the student a screen image of

the human body, tell him that he can increase the magnification to any detail,

and say "Your light pen is now a scalpel. You may cut anywhere you like."

Besides that, you may ask for explanations of any given parts, you may assign

other functions to his pen, such as that of forceps, you may ask for simulations

of movements, you may remove whole layers or organs for study, ~~assigning to~~
using the light pen to specify boundaries or point out particular things
~~the light pen new functions such as delimitation, or specification).~~
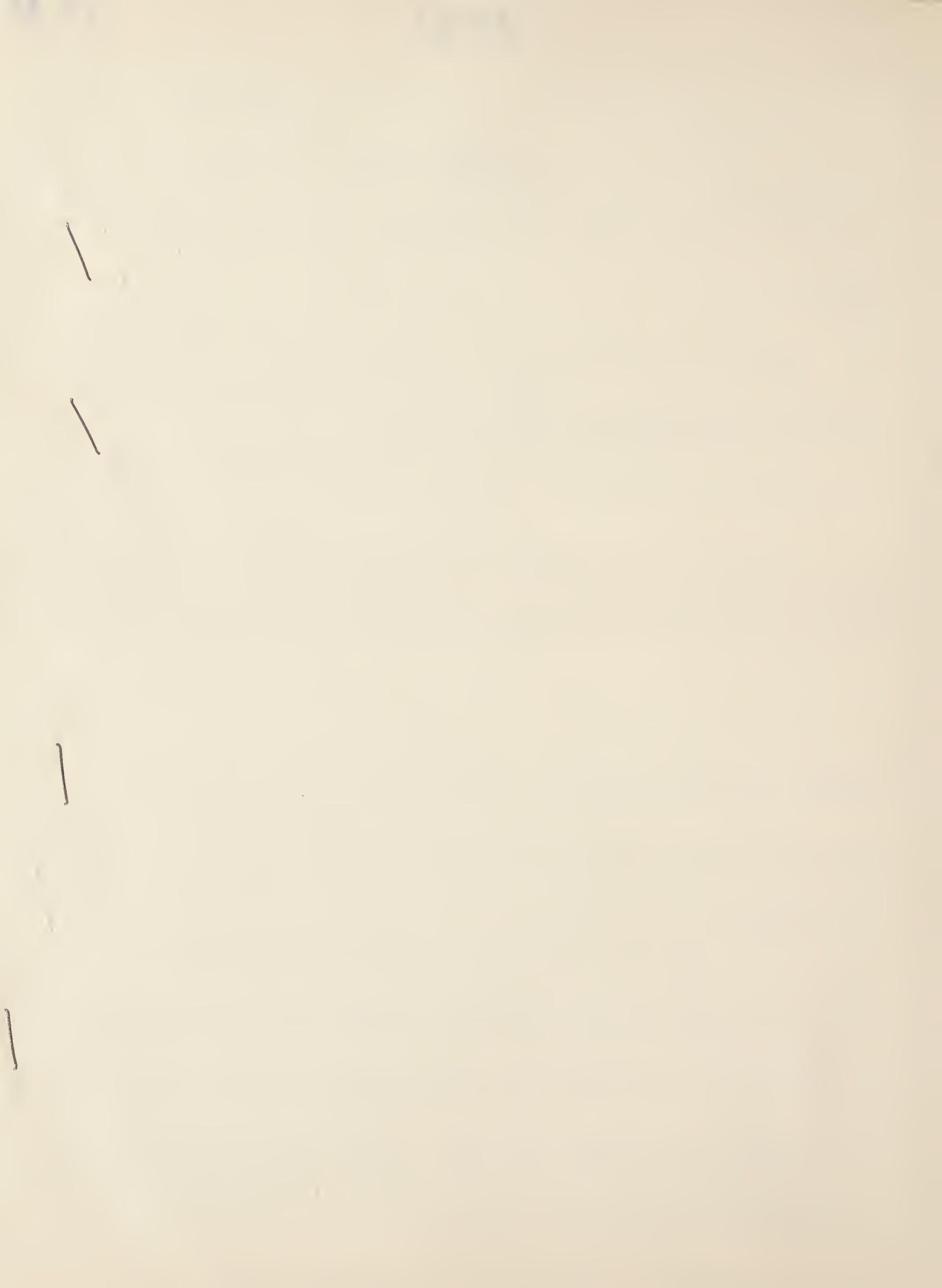
Consider creating a historical ~~read~~ world map ~~on~~ for a computer: complete map

information about the whole world, plus projection program w~~ith~~ to enable every

sort of projection to be made; the system is also to contain historical

data about politics, geography, ecology, and so on, by well bounded regions;

further, it is to contain dates linked with events and their geography,

so that for any event the user can immediately see where it happened, and

when.

Let me call your attention to an
example that made itself plain to me in the movie "Fantasia," which I saw

three years ago. Consider the slide now before you. I presume you recognize

the subject matter, and perhaps by now some of you may have guessed why I'm

showing it. This is obviously a frontal and a lateral view of the head of

Mickey Mouse. Now, there is something very unusual about the head of Mickey

Mouse which most people are unaware of. If you study the picture carefully

you may see what I mean. Viewed frontally, Mickey Mouse possesses two

circular ears which appear to face the viewer, permitting him to hear things

in front of him. But viewed laterally, it will be noticed that the ears of

Mickey Mouse appear to be positioned one in front of the other, in a rather

5

peculiar fashion. Are the ears of Mickey Mouse in reality diagonally placed

swiftly
upon his head? Or do they roll around, repositioning themselves as he turns

in relation to the camera? No, they do not. The decision to make two, and

only two, positions for the ears of Mickey Mouse was an operation-analytic

the way that
decision which makes him much easier to draw, much like giving him three fingers
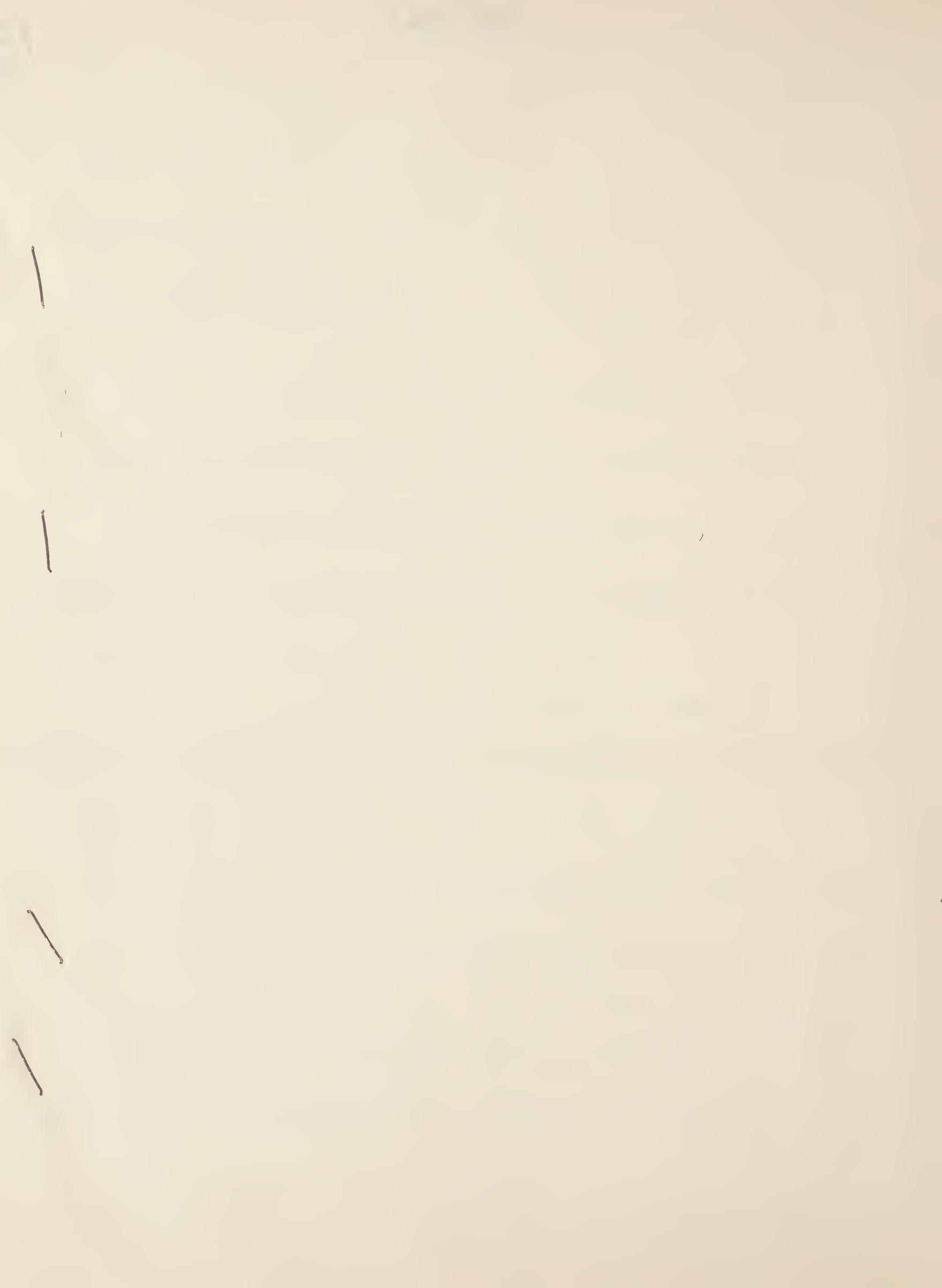
does.

What does this thing about the ears of Mickey Mouse show? It shows

something very simple and straightforward about the *pliability of* human visualization.

The ~~brain~~ *mind* can comprehend what it cannot see, and see what it cannot comprehend.

In the case of Mickey Mouse's ears, two completely contradictory views are

reconciled in the mind, and accepted without consideration as belonging to

the same creature.

(They are black and featureless, therfore yielding no clue as to which way

their orifices point.)

It follows, I think, that we can learn to manipulate, and "understand,"

~~special and quasi-special~~ *spatial and quasi-spatial* relations of a rather high order, visualizing (or

quasi-visualizing) the damnedest things.

While ~~xxxxxxxxxx~~ *I discussed* above the

question of "dimension" as it relates to graph theory in general, the question

of whether multi-dimensional displays are useful or appropriate for anything

is worth taking up. I understand that ~~IBM~~ *one corporation* internally has been programming a

three dimensional display, and that when queried, the programmer involved said

that he could see no purpose in a multi-dimensional display, since obviously

three dimensions is all the human intellect can take cognizance of.

This is not true. But there is an obvious question regarding the

visualization of many dimensions.

A word on multi-dimensional displays.   6

The classic and obvious manipulable multi-dimensional picture is the 4-cube,

or Tesseract.

The first things that people try

                                The usual obvious example, and consequently

the first thing that people try to program when they try to program multi-dimensional

                tesseract,
displays, is the ~~Tesseract~~, or the four-dimensional cube. It is of interest

that Donald MacKay, I understand, had a manipulable four-dimensional cube

displayed on a computer screen as long ago as 1947. Naturally, this was an

analog computer, which made the job peculiar from our current point of view,

but
~~put~~ anyway these things have been going on longer than we tend to realize.

The analog displays are of course suited only to special cases of this kind,

                he
but anyhow ~~you~~ did it.

Some psychologists believe the naturaltendency to see three

                      no more, no less —
dimensions-- ~~no more, no less~~ is wired into the human being, takes no training

and can't be improved on. Well, it's true that apparently three-dimensional

visualization is unlike ears, wired in; avoidance of the"visual cliff" is

observed now in many young animals. This indicates some sort of coordinate

transformation on an analog-computer basis, quite possibly similar to the ESL

Kludge,permitting the two dimensional retina to imagine three-dimensional

things. But never mind about that. ~~Let me call your attention to an~~

(

But supposedly

In a recent film by A. Michael Noll of Bell Laboratories supposedly

makes the four-cube completely comprehensible to the viewer. ~~This~~ *But this* point is

still arguable.

HFCM slides

OWA
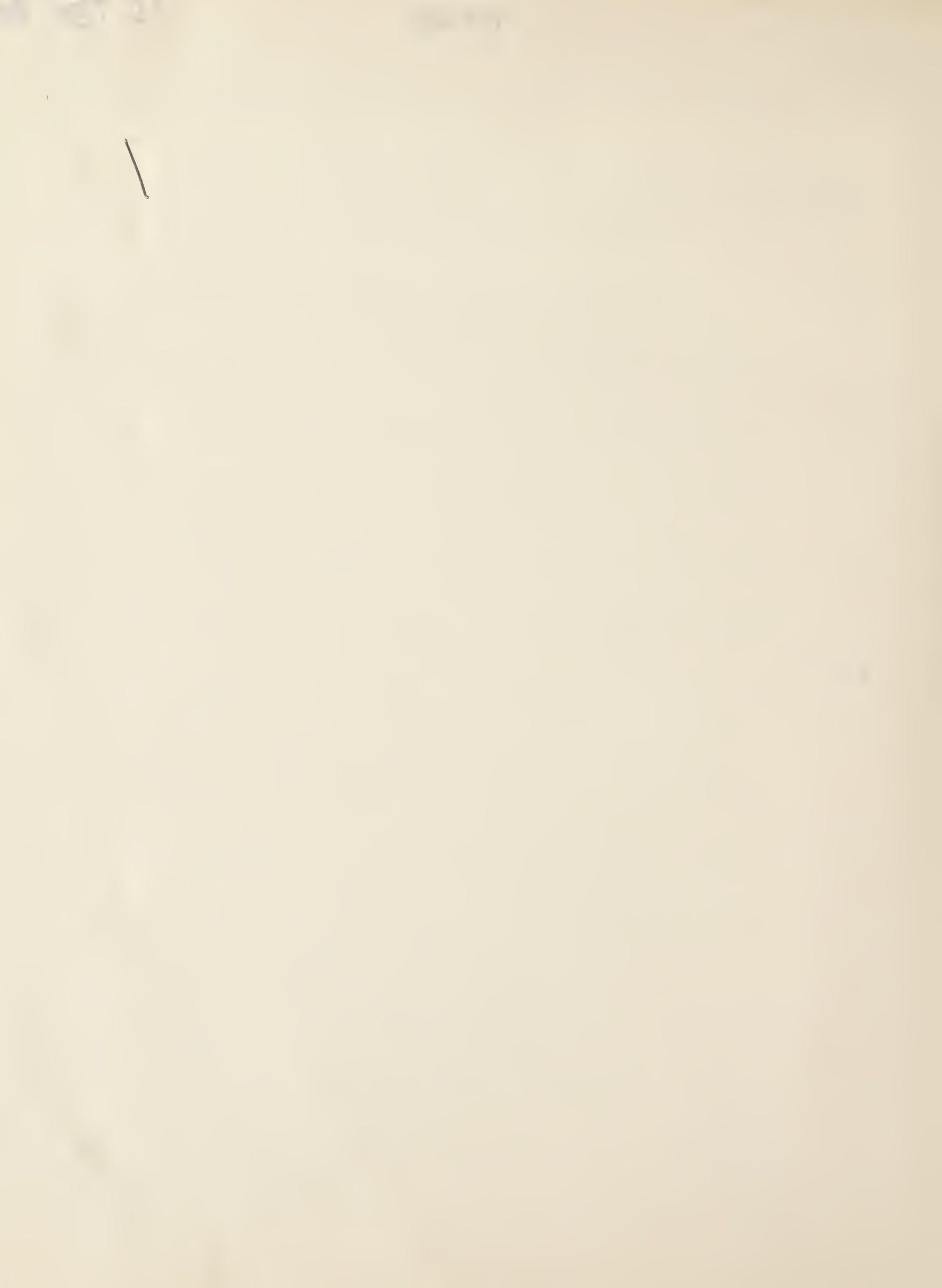
ACOUSTIC ~~ERA~~ DISPLAYS

→ sonic transformations?

1727

OWA

Television analogy: "suppose it's 1928."

etc.

(

(

OWA

Who is going to pay for it?

~~###~~ Well, who ~~always~~ pays?

When educators see what these systems can do, they will HOLLER UNCLE. And Uncle will buy.

BNW slides

(When introducing term "fantics"-- mention " mediatronics", "ideatechnics.")

(SCREENS)

When I throw out dates and predictions I realize I am at the Delphi of that

numbers racket. (DO SO)

Licklider has estimated that the cost of storing all our information

digitally, and making it available through vast feeder networks, is <u>identical</u>

to that of the systems now employed in all of publishing and letter writing.

But of course, the problem there is that the number of vested interests that

exist. If we were to adopt Licklider's suggestion, the money would go to all

different people, and I don't think anyone is going to ask for that very soon.

Not only our written archives, but our artistic creations, our architecture,

our investigations of the past, and everything else that should be kept, may well

best be kept in digital form: recallable, manipulable, quickly available. But this

CDC STATUES

brings to mind the dreadful possibility that instead of being subject to the natural

erosion of paper and stone, much of our heritage can be wiped out by an electrical

storm, or unexpected spasms of the earth's magnetic field. Such an event could

make the burning of the library at Alexandria seem minor.
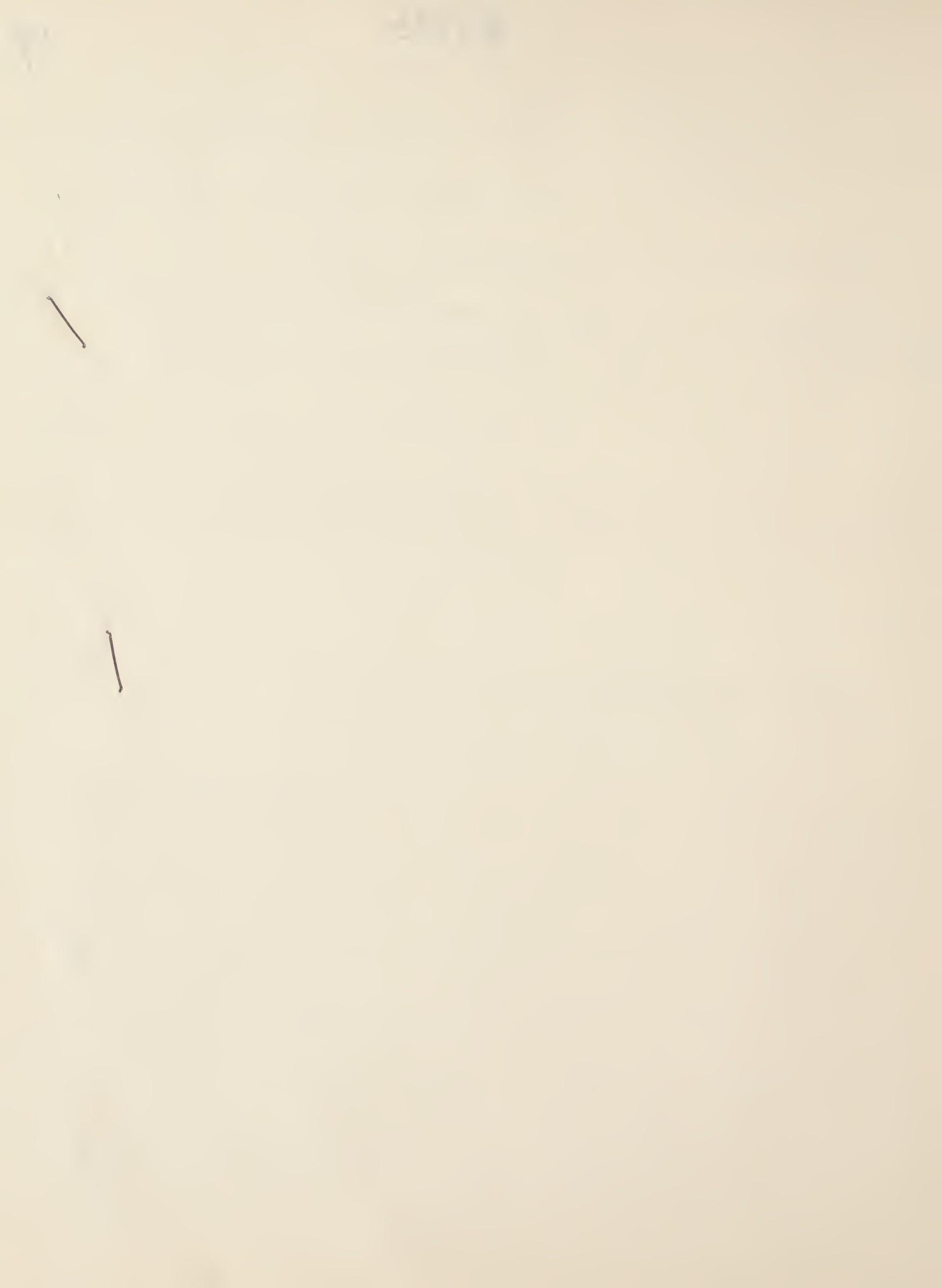
They systems and techniques I am proposing do not ~~need~~ ~~artificial~~ push the state of the art.

~~intelligence~~ Tremendously sophisticated programming techniques are unnecessary.

They do not need artificial intelligence. They do not need question answering

systems. They do not need sentence parsing paraph^{er}nalia. They do not need to

recognize voice or handwriting. They do not need to play chess or translate

other languages. No glamorous ~~gills~~ skills or break-through kinks are necessary.

In an important sense, all the new good things will be <u>like the old</u>.

Hypertexts will be more like books and plays than they will be like ~~catalogs~~

Socratic computer setups; hypergrams will be more like movies_∧than they will or diagrams

be like chess-playing routines or categorization ~~heur~~istics. heur

But just as the good things I forsee are simple extensions of the

things that already are, so are the bad. We will be in a new information   )

environment, but the problems that confront us in the new information environment

)

will be simple extensions of the older problems. However, the guidelines and

arrangements that provisionally guard against these problems in the existing

circumstance will be ~~wiped~~ swept away, and the attendant dangers of these changes

are past reckoning.

I am going to say a word or two now, not about the sorts of display media

which a world of on-line information will make possible, but about the unfortunate

consequences of a world of such information.

What was so bad about George Orwell's world of 1984? Was it that the

nation was eternally engaged in a war which no one could fathom and about which

no news could be had ~~about which~~? accurate No. Perhaps the greatest affront to our view of

human dignity in 1984 was that individuals could be anonymously harried and

threatened by members of the central authority through tele-communication

systems. HARASSMENT (Marg. cost lower Schelling Police budgets)

This is probably inevitable, and will be most disagreeable.

Why is it inevitable? Because, as Harold Lasswell has pointed out, there will

be no safeguards against the accumulation of vast data banks ~~banks~~ containing considerable

information on all the individuals in the nation. These data banks will include

not simply changes of addresses and telephone numbers, but listings of pecadillos

and liabilities, abilities and shortcomings. If computer-aided instruction becomes and SAMI

widespread, as it will, it seems likely that the most detailed information on usage

and response will be kept by the system and linked to the name of individuals.

If we come to have thorough on-line softcopy libraries, exactly the same circumstance

will pertain with regard to the books a man reads and the notes he takes. Can this

be prevented? I am hard put to say how it can. For one thing, the persons in

charge of the facility will want operating information on which to judge their own

success. And the information once gathered will past through many hands. USE IN SCHOOL RECORDS

What are the concrete motivational dangers attendant to these developments?

They are:

the natural intolerance of the custodial classes

the righteous indignation of the effective affected public

the self-interest of occupational groups

the self-service of individuals, cliques and clans.

I am saying that we need some kind of statuatory blocks to the use of

information-- that is, blockages of the records-- corresponding to, but far more

far reaching than, the way in which police records are locked up when an individual

reachs the age of 21. But how administrable thresholds and guidelines can be

acquired is beyond me.

This past
last July Congress debated and rejected (apparently in principal), a

common data pool for tax, census, and other information. Presumably that will

happen again, and the Congress will not wittingly set up such a thing soon.

But such a thing will come to be, Simply with the information accessible in

parallel systems, it can be accessed and inter-compared by anyone who may

jointly use these different systems.
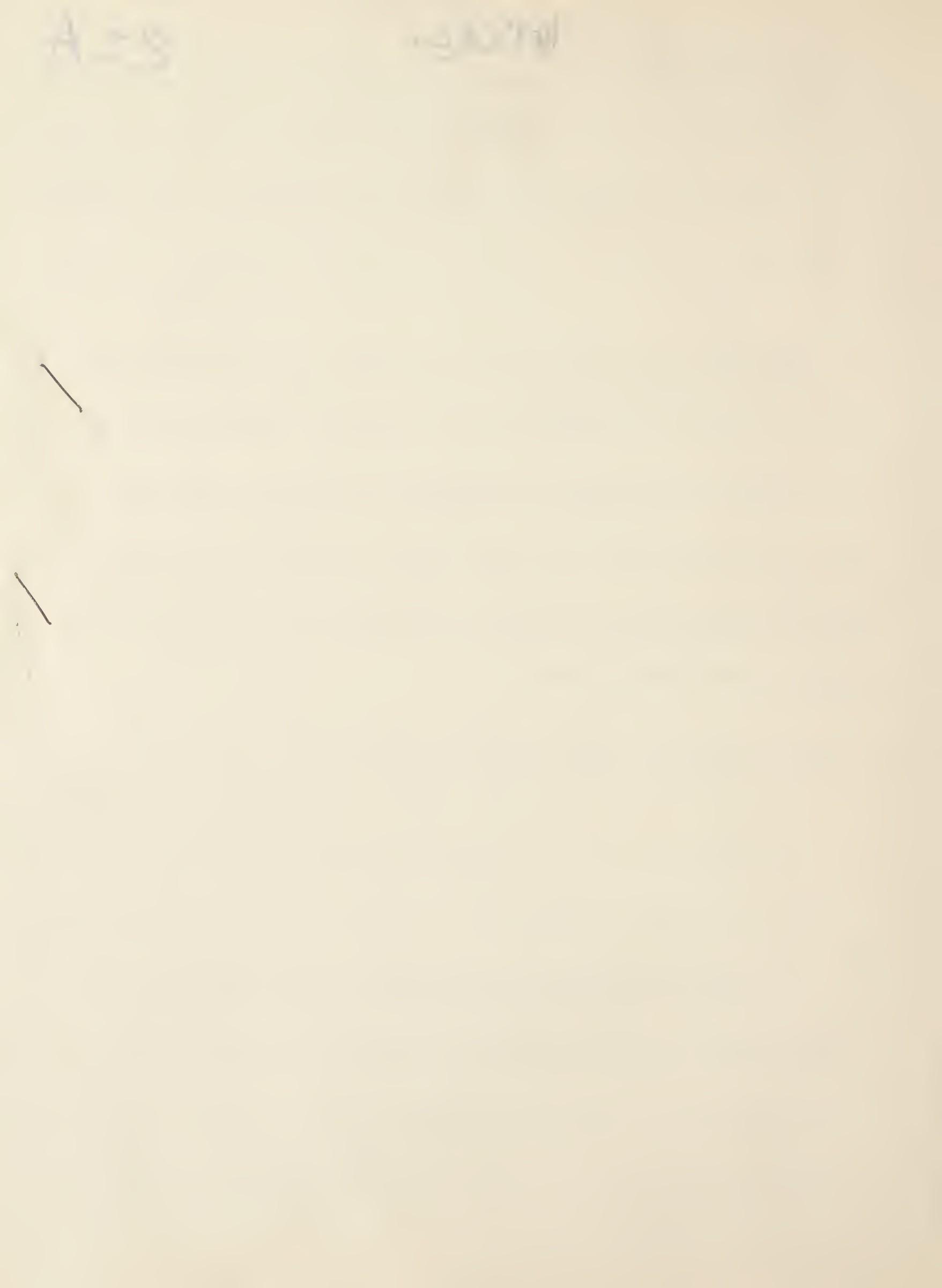
Another problem, distinct from the willful misuse of information, is the

problem of the inevitable misuse of information that is simply present, because it

is there. Trivialities ~~about people~~ which are written down, and available ~~in summary form~~ while

decisions are being made, ~~seem~~ *cease* to become trivial; they are attended to regardless how

trivial . Minor disciplinary infractions, for example, look very bad on a man's

record. The point can be best illustrated by an old anecdote that my gr*eat*~~and~~

grandfather used to tell about the captain and the first mate of a ship.

On the first mates's birthday he had a drink too many ~~for~~ *before* standing watch, and the

next day he found that the captain had written in the ship's log: 'The first mate

was drunk last night." The first mate went to the captain and asked that this be

stricken from the ~~log,~~ *log,* since it would have a serious effect on his career. The

captain said, "What is in the log is in the Log, and after all, it's true isn't

it?"

    The next morning the captain found written in the log, "The captain was

sober Last night."
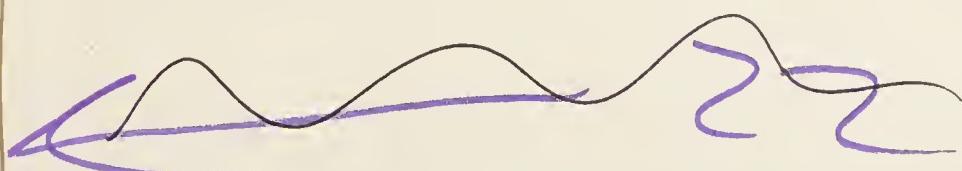
NASTY PHONE CALLS
not new, but much on
the rise.

1743

⟶ COST OF
HARASSMENT LOWER

Consider ① Economists
the economies of harassment
and the marginal propensity
to be nasty!
POLICE BUDGET also saving here

ETHICAL CODES OF,
THE BOOKKEEPING
OF PERSONAL RECORDS.
(⟶ ⊙ but how?)

(

(

⟵ 22)

)

)

1892
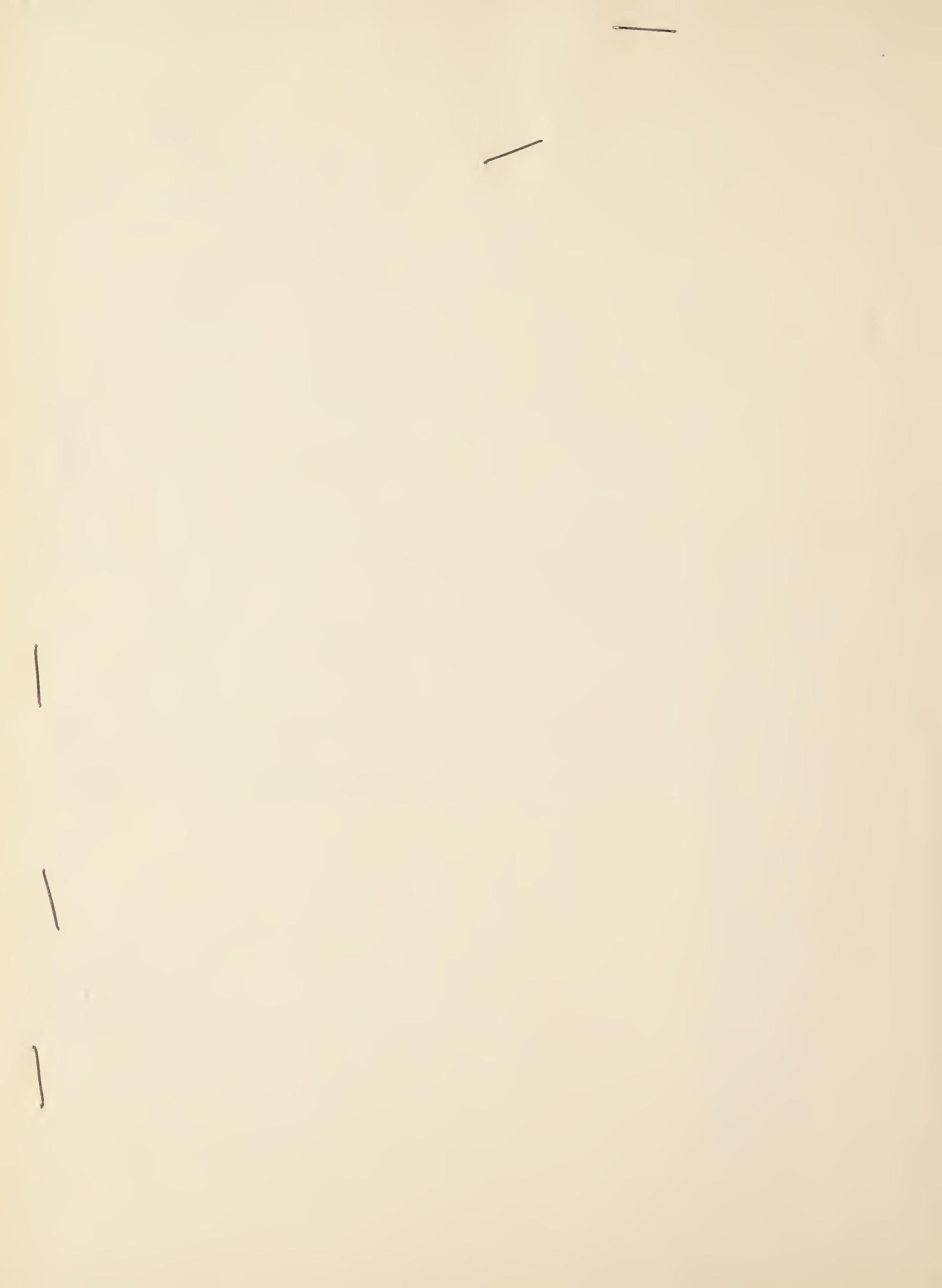
We also need statuatory <u>non-b</u>locks: if we are to have real education

through computer display, it is going to be necessary that the real information

be made available, and this is not now the case in our educational system.

The fact that evolution can not be taught in the schools of Tennesee, at least

legally, is an absurd example of a far more widespread thing. The real contro-

versies are simply made inaccessible at the elementary level, the real information

is simply impossible to get hold of for children or beginners. This is the

difference between the real subjects and the kid stuff; the disposition of those

who would teach is to water down. After all, we are told on every hand that

most scientists believe in God. The other falsehoods so widely promulgated within

our educational system

political information

medical information is an interesting example of material which is forbidden to

the general public. Now, more than ever, there is a pressing need for various

types of medical information which are being suppressed: for example, more than

esp.

ever, ~~the~~ teenagers need birth control information to say nothing of supplies.

Another question very much up for grabs in our ~~brand~~ *brave* new setup is ~~the~~ *that* traditionally

called   *and*
freedom of speech ~~in~~ the press-- though if these rights were exercised I doubt that

anyone would recognize them.

freedom of
How ~~at~~ *at*tenuated seem the rights of speech ~~in~~ *and* the press when the channels of

distribution are so easily controlled. We know what happens in a free press: Daily News publicity, handouts. BUT: compatibility...

Important points:

These are not to be facilities but <u>media</u>. The important distinction is this:

Facilities contribute, media re-form.

My view differs from that of these other prognosticators mainly in degree and

emphasis.

(Will such a world be <u>depersonalized</u>? This appears to be the view of people

who have been working in information retrieval and computer-assisted instruction.

10

(or what they turn into)

this and I think further that these fields will be <u>extremely personalized.</u> Let

us consider the movie and the automobile. For both of these, I believe it was

predicted that the human element would die out: indeed, at first all Fords were

black and no movie-makers were ever identified, but that is not the case today.

Indeed, the automobile is one of the principal forms of expression of personality:

in

in the style of driving, in the decorations-- from the grill of the Rolls Royce

HUGE DANGLING DICE MADE OF   AND OF COURSE MOVIE DIRECTOR.

to the <u>danglingpolyurethane foam dice</u>-- and in the things that you want to do

there. And of course movies we all know: every single part of a movie wears

the personal stamp of the man who made it, the director, and the people who played

the parts.

~~OWE~~ HFT

LIBERAL
    That is, <u>freeing</u>

1740